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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,692	07/31/2003	Yasunobu Suzuki	2003_1066A	7674
513 7590 08/23/2007 WENDEROTH, LIND & PONACK, L.L.P. 2033 K STREET N. W. SUITE 800 WASHINGTON, DC 20006-1021			EXAMINER CAVALLARI, DANIEL J	
			ART UNIT 2836	PAPER NUMBER
			MAIL DATE 08/23/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/630,692

Applicant(s)

SUZUKI ET AL.

Examiner

Daniel J. Cavallari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 11-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/5/2007 has been entered.

### ***Response to Arguments***

Applicant's arguments, see pages 7-9, filed 6/5/2007, with respect to the Figures, 112 first paragraph rejections, and 112 second paragraph rejections have been fully considered and are persuasive. The previous made rejections have been withdrawn. However, the Examiner notes that upon further review, new objections have been made and which are discussed in detail below.

### ***Claim Objections***

Claims 11, 12, 13, & 19 are objected to because of the following informalities:

In regard to Claims 11 & 12

- The claim states "...a load operable with both AC and DC..." however it is unclear what is meant by "operable" whether it be operable with both an AC and DC source or operable with an AC and DC input to the load itself.

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In regard to Claim 13

- The claim states "...a load operable with only AC..." however it is unclear what is meant by "operable" whether it be operable with only an AC source or operable with an AC input to the load itself.
- The term "half cycle sinusoidal wave modulation" is not one ordinarily used in the art nor does it describe a particular well known module scheme therefore will be examined as best understood and read upon by any DC to AC switched modulation scheme.

In regard to Claim 19

- The limitation of "... a fuel cell and compressed hydrogen for the fuel cell can be reserved" is grammatically incorrect. Particularly "can be reserved" is awkward as it is unclear exactly that which is being referenced as the statement is incomplete.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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Claims 11 & 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Takayuki (JP 09-051638).

In regard to Claim 11

A power supply system comprising:

- A battery operable to store DC power (8, figure 1).
- A control circuit (13) operable to:
  - (1) Supply AC power from an AC power source (2) to the load (5)
    - (i) while the battery is being charged by a DC power source (6) until the battery is fully charged (See Figure 1).
    - (ii) when the battery approaches a minimum charge value (eg. The battery has been depleted to a minimum charge value, power is switched to the AC source)
  - (2) Supply the DC power from the battery to the load once the battery has been fully charged.

The Examiner notes that the claim language "operable to" is merely functional and that it has been held that the recitation of an element that is "adapted to" or "capable of" performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138.

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In regard to Claim 14

- Wherein the DC power source comprises at least one of a wind turbine generator operable to generate DC power to charge the battery, a solar cell (6a, figure 1) operable to generate DC power to charge the battery, and a fuel cell operable to generate DC power to charge the battery.

Claim 12 is rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al. (US 6,602,627).

In regard to Claim 12

A power supply system comprising:

- A battery (234, Figure 5) operable to store DC power;
- A fuel cell (230) operable to generate DC power to charge the battery.
- A three-winding electronic transformer (240) having a first bidirectional terminal connected to the battery (242) a second bidirectional terminal (read on by the winding connected to side 222) for connection to an AC power source and a third bidirectional terminal (read on by the output side of 246) for connection to the load, the first, second and third bidirectional terminals being insulated from each other (via air), wherein the three-winding electronic transformer is operable to
  - (1) During a first time period:

- (i) supply AC power from the AC power source to the load while the battery is being charged by the fuel cell until the battery is fully charged.
- (ii) supply the DC power from the battery to the load once the battery has been fully charged or if the AC power source fails.
- (2) During a second time period:
  - (i) supply the AC power from the AC power source to the load.
  - (ii) convert the AC power from the AC power source into DC power and supply the DC power to the battery to charge the battery, and the fuel cell is operable to charge the battery while the battery is being discharged.

The Examiner notes that the claim language "operable to" is merely functional and that it has been held that the recitation of an element that is "adapted to" or "capable of" performing a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any patentable sense. *In re Hutchinson*, 69 USPQ 138. The Examiner further notes that Liu teaches all the physical components and device properties required to perform the operable characteristics of the claimed limitations recited above.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takayuki in view of Colborn (US 2003/0167105).

Incorporating all arguments above, Takayuki fails to teach the DC power source comprising a fuel cell and compressed hydrogen. Colborn teaches a power supply system incorporating both a battery (1402) and a fuel cell utilizing compressed hydrogen (1404) (See Figure 14D & Paragraphs 56 & 135).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate both the battery and fuel cell taught by Colborn with the power supply system of Takayuki who only teaches a battery and solar power backup system. The motivation would have been to provide diversified backup power supply system thereby increasing reliability of the system.

Claims 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (hereinafter referred to as Liu) in view of Jungreis (US 6,184,593).



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Incorporating all arguments above, Liu teaches a fuel cell charging a battery as well as an AC input (222) but fails to teach a third source connected to provide battery charging.

Jungreis teaches a DC bus used to provide a battery (16') with a plurality of charging sources (18a, 18n, 20a, 20b) (See Figure 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate additional power supply sources including solar (see Column 3, Line 62 to Column 4, Line 5) as taught by Jungreis in which to charge the battery in addition to the fuel cell. The motivation would have been to take advantage of the many economical and environmental benefits associated with solar power.

Liu further teaches:

In regard to Claim 17

- A controller (26) operable to control operation of the three-winding electronic transformer (See Figure 1 & Column 5, Lines 8-30).

In regard to Claim 20

- Wherein compressed hydrogen for the fuel cell can be reserved [The Examiner notes that the claim does not state that the "power supply system" of the invention is reserving the "compressed hydrogen" but rather that "compressed hydrogen" in itself can be reserved which is a well known fact by simply placing it in a proper storage receptacle (See Column 3, Lines 20-25).

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Claims 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. (US 6,602,627) in view of Mohan et al. (US 5,334,877).

In regard to Claim 13

A power supply system comprising:

- A battery (434, Figure 7) operable to store DC power.
- A fuel cell (330, Figure 6) operable to generate DC power to charge the battery.
- A bidirectional converter (336, Figure 6).
- A three-winding electronic transformer (340, Figure 6) having a first bidirectional terminal connected to an output of the bi-directional converter (342, Figure 6), a second bidirectional terminal for connection to an AC power source (340, figure 6), a third bidirectional terminal (344, Figure 6) for connection to the load,
- A high frequency transformer (344, Figure 6),
- The three-winding electronic transformer is operable to:
  - (1) During a first time period:
    - (i) supply AC power from the AC power source to the load while the battery is being charged by the fuel cell until the battery is fully charged and
    - (ii) supply AC power from the DC power stored in the battery to the load once the battery has been fully charged or if the AC power source fails by alternately reversing a high frequency modulation phase of the two unidirectional switches or the two pairs of unidirectional switches of the first modulation/demodulation semiconductor switch per half cycle of a commercial frequency and then

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demodulating to remove a sinusoidal wave AC output with the third modulation/demodulation semiconductor switch

(2) During a second time period

(i) supply the AC power from the AC power source to the load and

(ii) convert the AC power from the AC power source into DC power and supply the DC power to the converter for performing a boost type rectifying operation at a high power to the DC power and supplying the DC power to the battery to charge the battery

- The three-winding electronic transformer is operable to convert the DC power from the battery into the AC power when the battery has been almost fully charged at and the AC power source has not failed for automatic phase synchronization on a side of the three-winding electronic transformer of the AC power source to achieve a reverse flow of the AC current, and the fuel cell is operable to charge the battery while the battery is being discharged.

[The Examiner notes that the claim language "operable to" is not a positive recitation but only requires the ability of the device to perform said functions and the teachings of Liu disclose a device which is operable to perform said functions above. See Figure 6).

Liu teaches a bi-directional converter but fails to explicitly teach the details of said converter used. Mohan et al. (hereinafter referred to as Mohan) teaches a converter which converts DC power from a battery into a single-phase full-wave rectification

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waveform by half cycle sinusoidal wave modulation (See Figure 1 & Column 6, lines 1-30).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the bidirectional modulated converter as taught by Mohan with the power supply apparatus of Liu. The motivation would have been to use a technique well known in the art and available, such as that of the converter of Mohan.

The Examiner notes that the bi-directional inverter taught by Mohan would have been obvious to use in place of the inverters (426, 436, & 450) as shown in Figure 7) and that all the inverters comprise modulation/demodulation semiconductor switches and further that each comprise two unidirectional switches (eg. 30a & 32a, 30d & 32d) (See Figure 1).

- First modulation/demodulation semiconductor switch connected between the first bidirectional terminal and the high frequency transformer, a second modulation/demodulation semiconductor switch connected between the second bidirectional terminal and the high frequency transformer and a third modulation/demodulation semiconductor switch connected between the third bidirectional terminal and the high frequency transformer, the first, second and third bidirectional terminals being insulated from each other, wherein the first modulation/demodulation semiconductor switch includes two unidirectional switches or two pairs of unidirectional switches.

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Claims 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al. in view of Mohan et al. in further view of Jungreis (US 6,184,593).

Incorporating all arguments above, Liu teaches a fuel cell charging a battery as well as an AC input (222) but fails to teach a third source connected to provide battery charging.

Jungreis teaches a DC bus used to provide a battery (16') with a plurality of charging sources (18a, 18n, 20a, 20b) (See Figure 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate additional power supply sources including solar (see Column 3, Line 62 to Column 4, Line 5) as taught by Jungreis in which to charge the battery in additional to the fuel cell. The motivation would have been to take advantage of the many economical and environmental benefits associated with solar power.

Liu further teaches:

In regard to Claim 18

- A controller (26) operable to control operation of the three-winding electronic transformer (See Figure 1 & Column 5, Lines 8-30).

In regard to Claim 21

- Wherein compressed hydrogen for the fuel cell can be reserved [The Examiner notes that the claim does not state that the "power supply system" of the invention is reserving the "compressed hydrogen" but rather that "compressed

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hydrogen" in itself can be reserved which is a well known fact by simply placing it in a proper storage receptacle (eg. 52, Figure 2 of Liu) (See Column 3, Lines 20-25).

### **Conclusion**

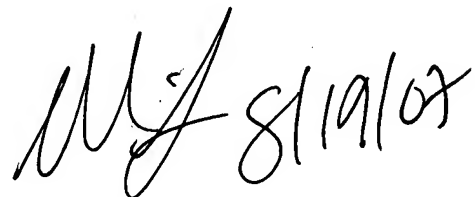
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Cavallari whose telephone number is (571)272-8541. The examiner can normally be reached on Monday-Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on (571)272-2800 x36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Cavallari

August 16, 2007

A handwritten signature in black ink, appearing to read 'MS 8/19/07', is written over the printed name and title of Michael Sherry.

MICHAEL SHERRY  
SUPERVISORY PATENT EXAMINER